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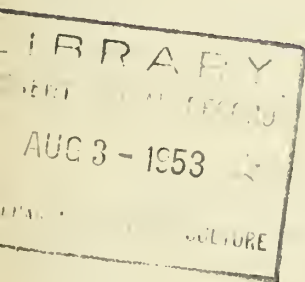


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X The Relation of High Temperatures to the Prevalence of Dry-  
Textured Fruit in the Deglet Noor Date Crop X



By

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## The Relation of High Temperatures to the Prevalence of Dry-Textured Fruit in the Deglet Noor Date Crop

Dry-textured Deglet Noor dates differ from what might be considered normal dates in several respects. They are hard and rather unyielding, usually dull and somewhat wrinkled, and often opaque and whitish in color of flesh in contrast with the translucence and amber flesh color of good dates. The pH of the flesh of dry-textured dates is lower than that of good ones. Whereas the pH of good dates is mostly 6.0 or higher and never goes far below 6, the pH of dry-textured dates may be below 5.5, and even as low as 5.0. Extremely poor quality dates may have pH values still lower. Dry-textured dates are normally hydrated before they are marketed. Those with pH values higher than about 5.5 are readily hydrated, but as the pH drops below this value hydration becomes increasingly difficult.

In total sugar content dry-textured dates do not differ materially from good-textured ones. They frequently differ, however, in that a larger portion of the sugar in dry dates is found in the form of sucrose and less as reducing sugars than in dates of a more desirable texture. The characteristic Deglet Noor flavor is present in fruits with pH values as high as 6.0, but this flavor decreases as the pH decreases. The moisture content of dry-textured dates is usually but not necessarily lower than that of the more desirable type.

The very large differences that occur between seasons in the percentage of the Deglet Noor date crop that is dry-textured is evidence that climate is associated in some manner with dry texture. Various climatic features have been cited by growers as being involved. Among these are hot weather in late summer or autumn or both, periods of high humidity during the growing or ripening season, rainfall at some critical time of the growing season, and early bloom with the result that the crop ripens before the heat of the summer has eased off.

The present report indicates a possible relation between high temperatures and dry texture. Studies on the possible relation of intensity or duration of periods of high humidity gave negative results. Rainfall during the growing season likewise was not related to the fruit quality under consideration. No consistent relation was found between the prevalence of dry-textured fruit and mean monthly temperatures from June through October, average maximum temperatures in the same period, or the highest temperatures reached in those months.

The best relation between a climatic characteristic and the quality of the crop was the average maximum temperatures for the second half of April and the month of May. High average maximum temperatures in one or both of these periods coincided with years of dry crops, and low average maximum temperatures in both of these periods were associated with crops of exceptionally good quality.

On the basis of information gathered from growers and packers of many years' experience, the years of best fruit quality since 1930 were 1930, 1932, 1933, 1935, 1941, 1942, 1944, 1948. The crops of 1930 and 1944 were considered outstanding. The years of poorest or driest fruit quality in the same period were 1934, 1936,



1940, 1943, 1947, and 1952. The crops of 1934 and 1952 were probably the poorest with respect to the quality under consideration. Crops of intermediate quality were produced in the years not mentioned above except as the quality was influenced by other factors. Heavy rain damage occurred in 1931, 1939, and 1945. The freeze of January 1937 influenced the quality of the crop of that year and to some extent that of 1938.

In figures 1 to 9 are presented the average maximum monthly temperatures from March to October from 1930 to 1952, and also those of the second half of April for the same period. In figure 10 the same data for the second half of April and for May have been combined to show the relation between these temperatures and the crop quality. The second half of April is used rather than the whole month because a slightly better relation with the crop quality is found.

A comparison of the temperatures shown in figure 10 with the general classification of the crop quality of each year shows that in all years with good quality crops the average maximum temperatures in the second half of April were 91° F. or lower, and the average maximum temperatures in May were 95° or lower. In no year was an excellent crop produced when the average maximum temperature in May was over 95°.

Dry-textured crops have been associated with short period of intense heat and with protracted periods of moderately high temperatures in early summer (April and May). In 1947 a temperature of 119° occurred on May 1, but on only 9 days in May did the temperature reach 100°. On the other hand, in 1952 the highest temperature in May was only 109°, but a temperature of 100° or more was reached on 21 days in the month. The texture of both of these crops was characterized by extreme dryness.

The crop of 1946 was probably damaged somewhat by the high temperature prevailing in the second half of April, the warmest such period in the years recorded. On the basis of the average maximum temperatures in April and May 1951 a rather high quality crop might have been expected. However, in May of that year a temperature of 116° occurred on the 27th and 113° on the 26th and 28th. Only in 1947, a dry crop year, has so high a May temperature been recorded in the Coachella Valley within the period studied. Although the 1951 crop was not exceedingly dry, neither was it of top quality. The crops of 1949 and 1950 were not of top quality, a condition that might be explained by April 16 to 30 average maximum temperatures that were somewhat too high to permit the best development of the fruit.

In figure 11 are plotted the average maximum temperatures for the months from March to October of certain selected years. The years of 1930, 1933, 1944, and 1948 were chosen to represent the years of good quality crops, and 1934, 1940, 1947, and 1952 to represent the years of dry-textured crops. Considerable overlapping of the good and poor quality crop years occurs in March, April, June, July, August, September, and October. Only in May is the separation complete. It can therefore be concluded that there is no close relation between dry texture in the dates and the average maximum temperatures of the months listed other than May. As stated previously, high average maximum temperatures in the second half of April or a few hot days in May have been associated with moderately dry-textured crops.

The relation between crop quality and average maximum monthly temperatures is shown also in table 1. The warmest and the coolest months are listed and the intermediate ones omitted. Likewise, some of the best crop years and some of the poorest with respect to the dry texture are listed and the years of intermediate crop quality are omitted. The best association between quality and temperature is found in May, the second half of April, and the whole month of April, respectively.

Seasons from 1930 to 1952 have been tabulated in respect to average maximum monthly temperatures for April and May, and the normal maximum temperature for these months (table 2.). Good quality crops were produced in only a few years when the average maximum was above normal for April and May. There were 14 years in which the temperatures were above normal in April and in only 3, 1930, 1932, and 1948 were high quality crops produced. Only 1 high quality crop (1948) was produced in the 12 years of above normal May temperatures. Likewise, the 1948 crop was the only high quality crop produced in years in which the temperatures of both April and May were above normal. No dry-textured crops were produced in years in which the temperatures of both April and May were below normal. The average maximum temperatures in May 1932, 1938, and 1942 were normal, hence these years do not appear in the columns in table 2 under May. The normal temperatures as used in table 2 were the 25 year averages ending with 1930.

The point must be emphasized that the relation between temperature and date fruit quality which has been described applies only to the Deglet Noor variety. Most other varieties, especially the soft or invert sugar type, do not appear to be subject to as large variations in quality from year to year as the Deglet Noor.

### SUMMARY

Dry-textured crops of Deglet Noor dates were produced in years of high average maximum temperatures in the second half of April or in the month of May, whereas dates of the desirable soft texture were produced in years when the average maximum temperatures of both of these periods were relatively low. No other characteristic of the climate was found that was as consistently related to fruit texture as temperatures during these periods of growth and development. The association of high temperatures with fruit quality described applies only to the Deglet Noor variety.

### Acknowledgments

The temperature and rainfall data were obtained from the published records of the U. S. Weather Bureau. The humidity data were obtained from charts in the files of the U. S. Date Garden, Indio, California.



Table 1. Association of relatively cool and hot average maximum monthly temperatures with dry-textured Deglet Noor date crops.

Month	Relation of Temperature to texture of crop			
	Cool Seasons		Hot Seasons	
	Dry texture	Good texture	Dry texture	Good texture
March	77° F. or lower		83° F. or higher	
	1952	1935	1934	1933
		1948	1936	
			1940	
			1947	
April 1-30	85° F. or lower		91° F. or higher	
	None	1941	1936	None
		1942		
		1944		
April 16-30	82° F. or lower		96° F. or higher	
	None	1933	1934	None
		1942	1943	
		1944		
May	92° F. or lower		96° F. or higher	
	None	1930	1934	None
		1933	1936	
		1935	1940	
		1944	1943	
			1947	
			1952	
June	99° F. or lower		103° F. or higher	
	1934	1941	1936	1930
		1944	1940	1935
			1947	1942
July	106° F. or lower		108° F. or higher	
	None	1944	1934	1930
		1948	1940	1933
			1943	1942
			1947	
			1952	
August	105° F. or lower		107° F. or higher	
	1943	1930	1940	1933
	1947	1935	1952	1944
		1941		1948
September	101° F. or lower		104° F. or higher	
	1936	1930	1943	1942
	1940	1941	1947	
		1944	1952	
October	90° F. or lower		94° F. or higher	
	1936	1935	1934	1933
		1941	1936	1944
			1952	



Table 2. Seasons of average maximum monthly temperatures Above and Below normal, Indio, California<sup>1/</sup>

April		May		Both months	
Below normal	Above normal	Below normal	Above normal	Below normal	Above normal
1933	1930	1930	1931	1933	1931
1935	1931	1933	1934	1935	1934
1938	1932	1935	1936	1944	1936
1941	1934	1944	1937	1945	1937
1942	1936	1945	1939		1939
1944	1937	1946	1940		1940
1945	1939	1949	1941		1943
1951	1940	1950	1943		1947
1952	1943		1947		1948
	1946		1948		
	1947		1951		
	1948		1952		
	1949				
	1950				

<sup>1/</sup> Based on 25 year record ending in 1930.



Figure 1. AVERAGE MAXIMUM TEMPERATURES FOR MARCH 1930 to 1952, INDIO, CALIFORNIA

Broken line indicates normal

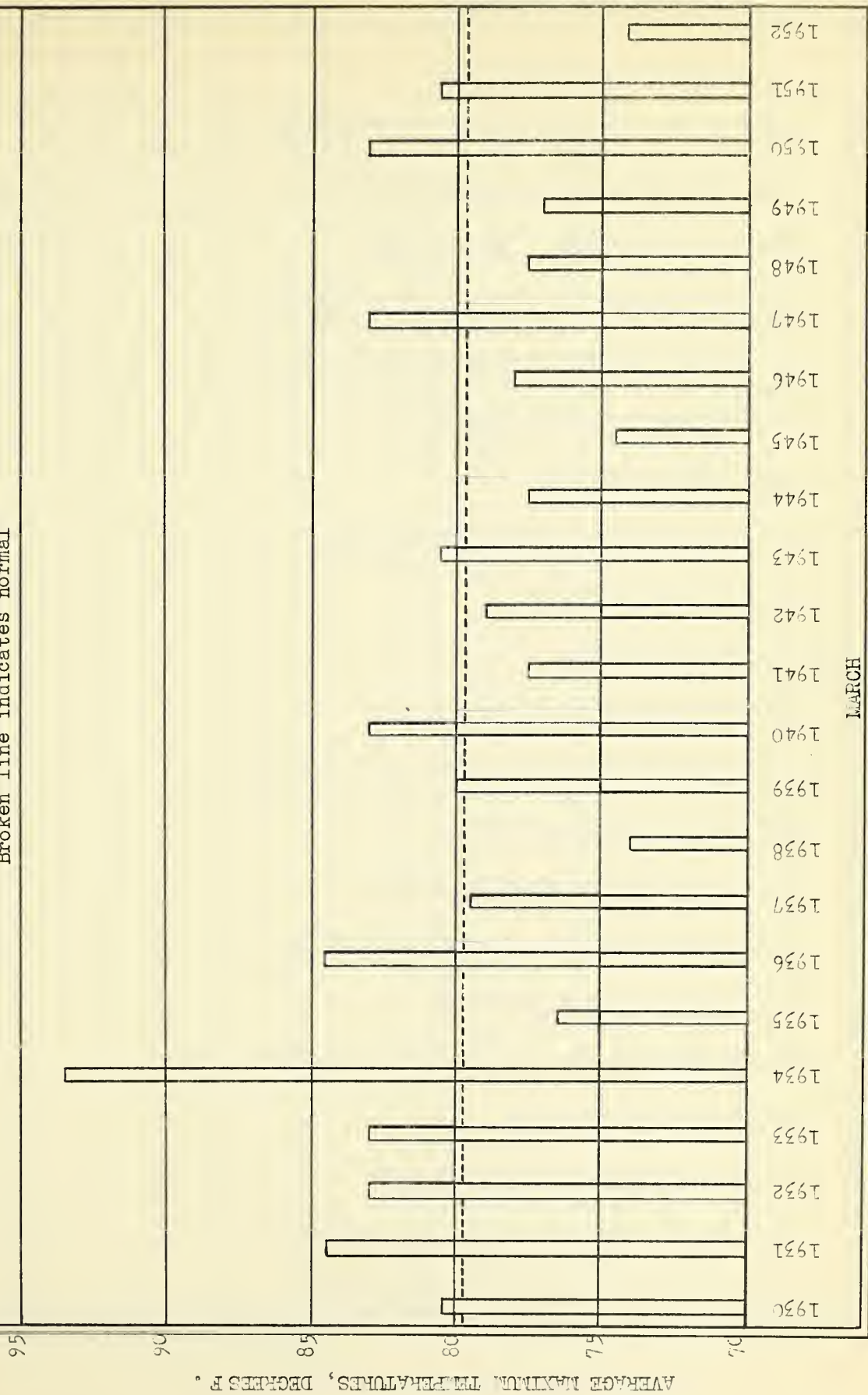






Figure 2. AVERAGE MAXIMUM TEMPERATURES FOR APRIL 1930 TO 1952, INDIO, CALIFORNIA

Broken line indicates normal

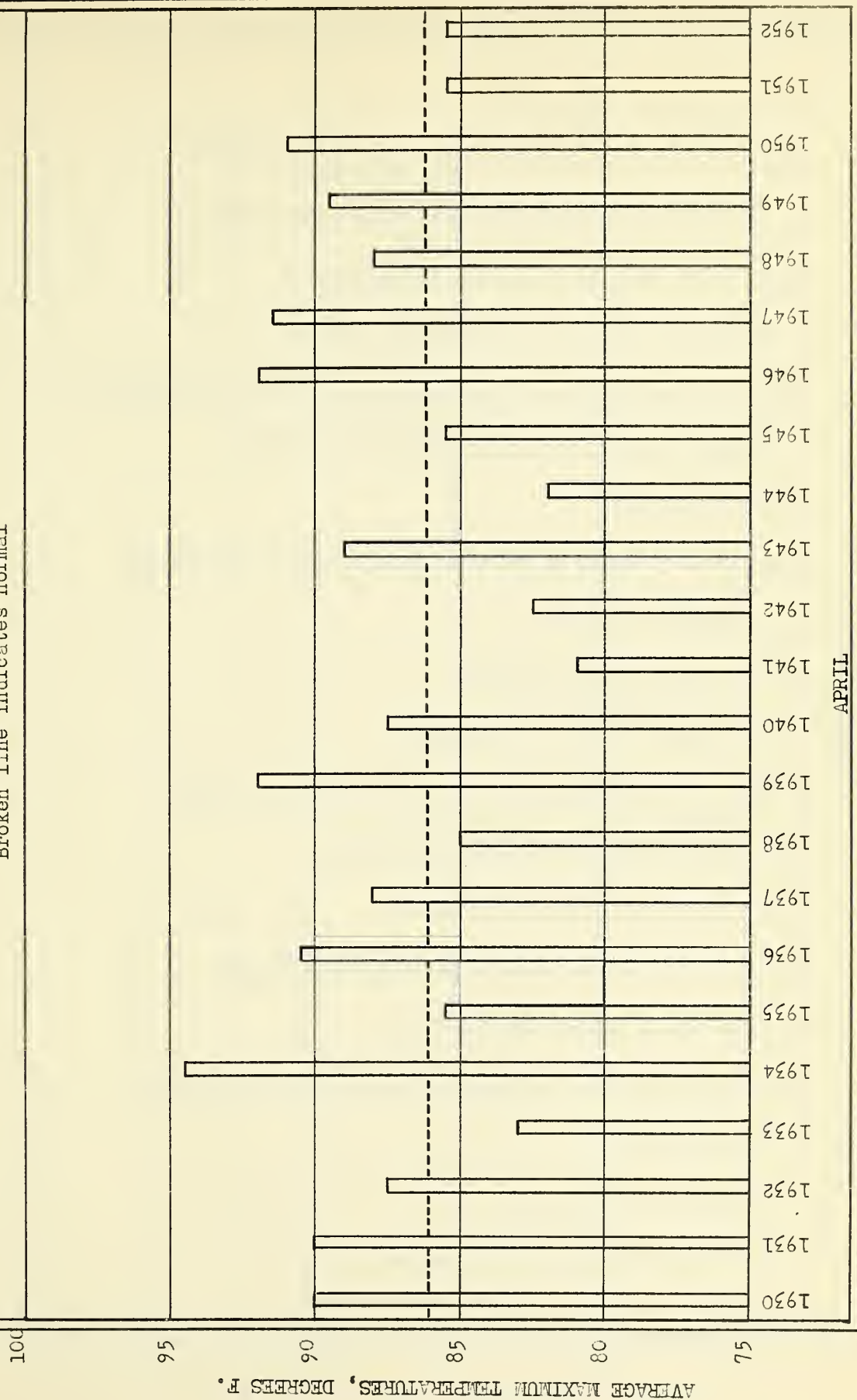




Figure 3. AVERAGE MAXIMUM TEMPERATURES FOR APRIL 16 to 30, 1930 to 1952, INDIO, CALIFORNIA

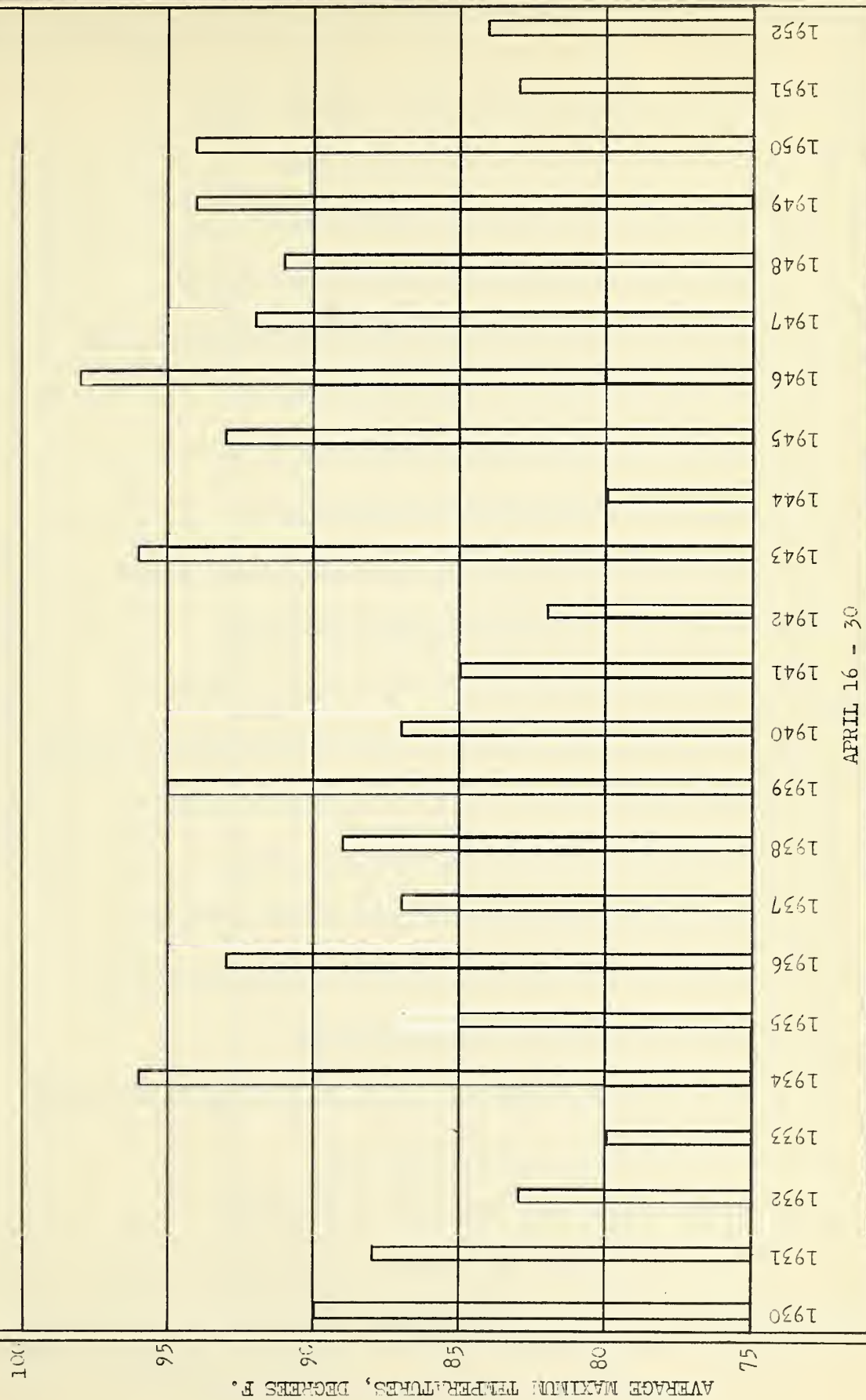
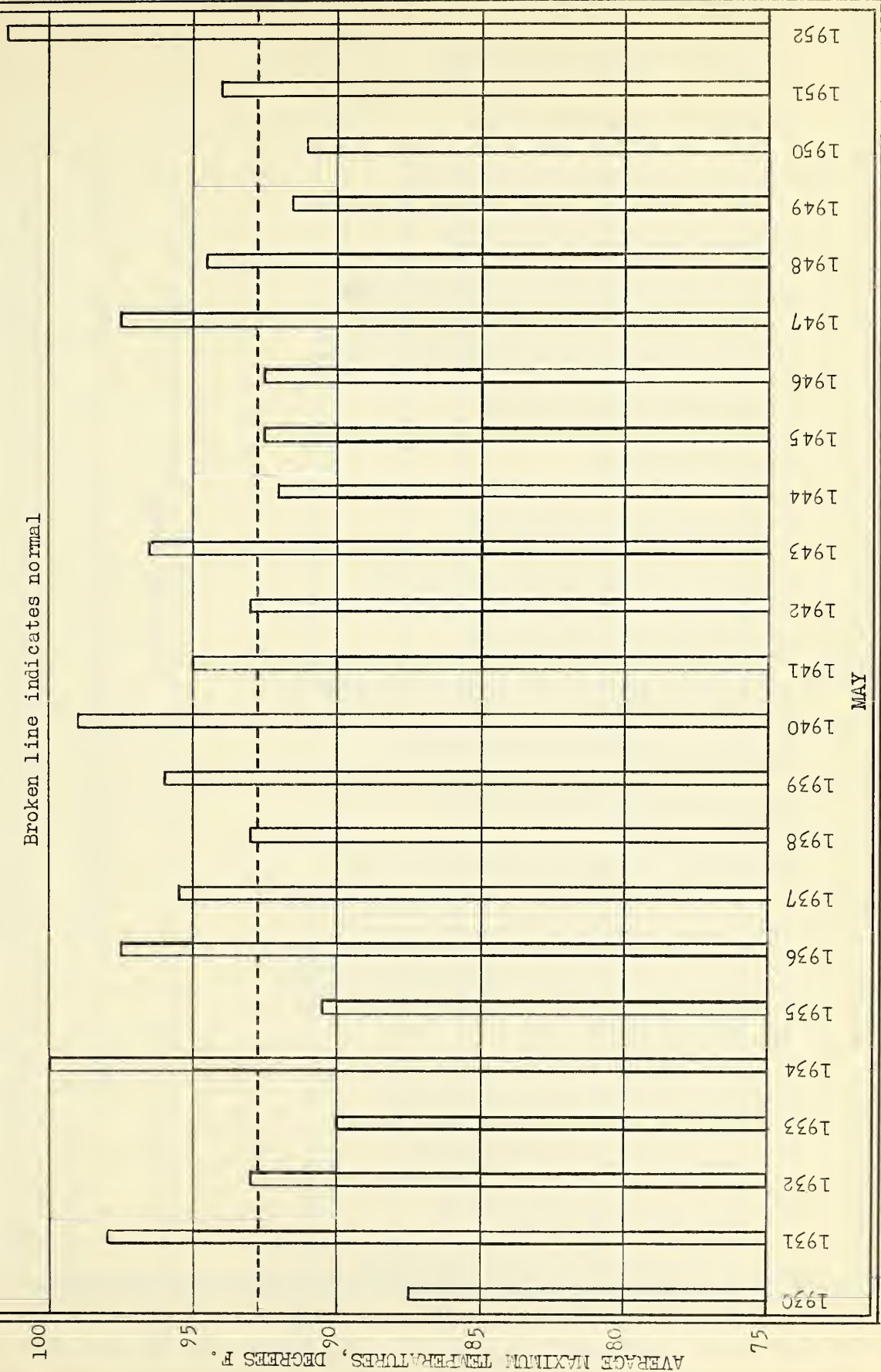






Figure 4. AVERAGE MAXIMUM TEMPERATURES FOR MAY 1930 to 1952, INDIO, CALIFORNIA





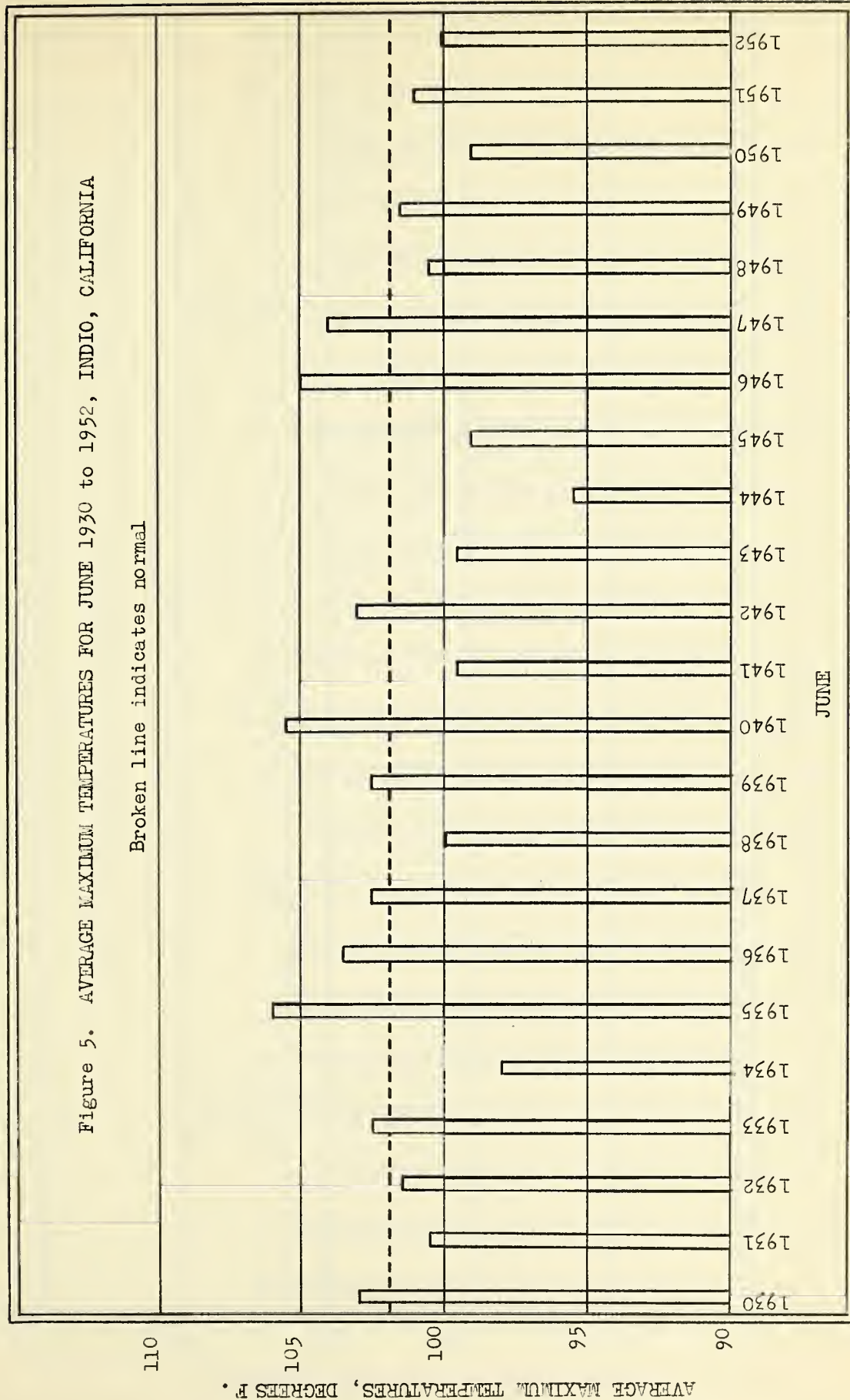






Figure 6. AVERAGE MAXIMUM TEMPERATURES FOR JULY 1930 TO 1952, INDIO, CALIFORNIA  
Broken line indicates normal

115

110

105

100

95

90

AVERAGE MAXIMUM TEMPERATURES, DEGREES F.

1930

1931

1932

1933

1934

1935

1936

1937

1938

1939

1940

1941

1942

1943

1944

1945

1946

1947

1948

1949

1950

1951

1952

JULY



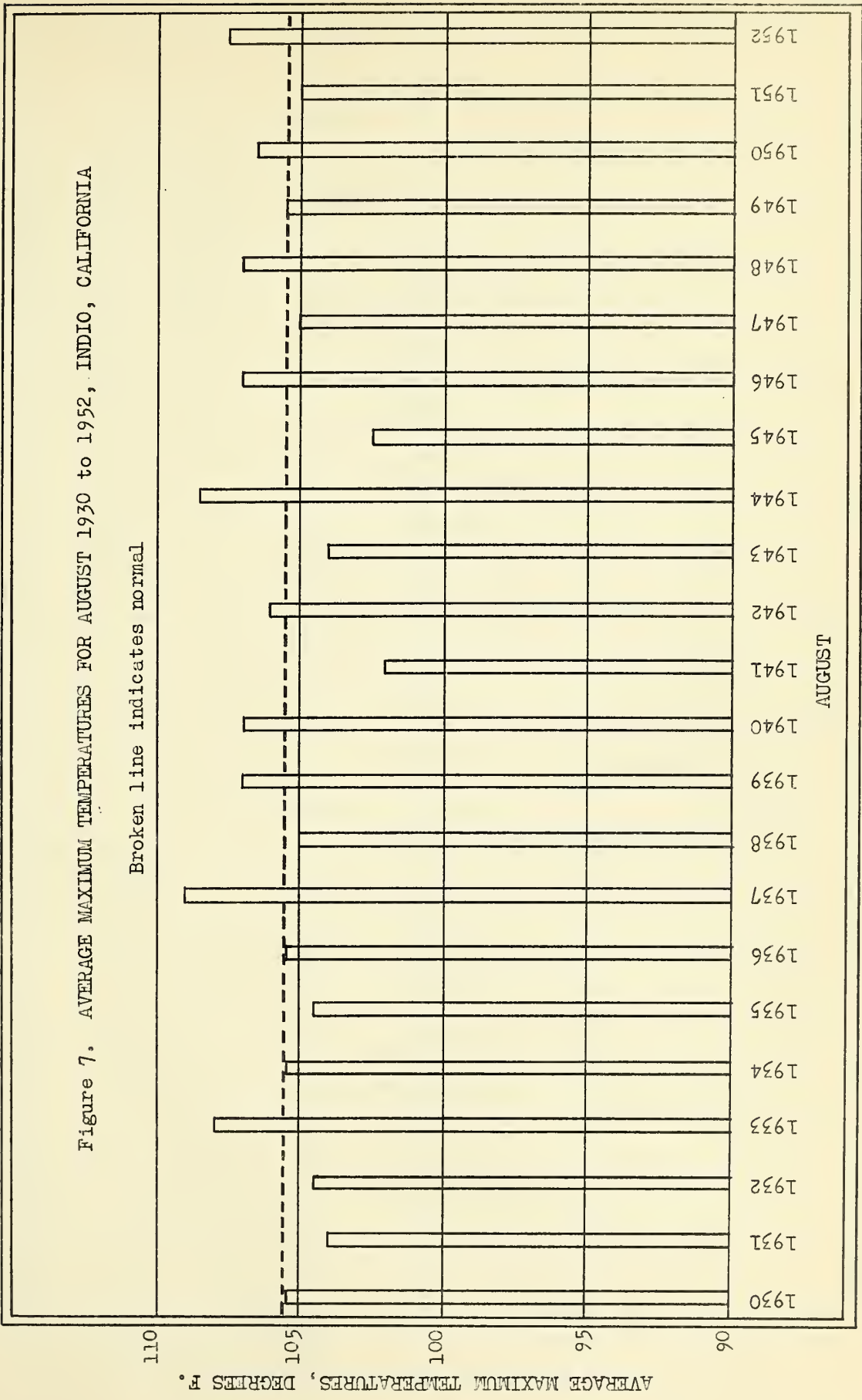


Figure 7. AVERAGE MAXIMUM TEMPERATURES FOR AUGUST 1930 to 1952, INDIO, CALIFORNIA





Figure 8. AVERAGE MAXIMUM TEMPERATURES FOR SEPTEMBER 1930 to 1952, INDIO, CALIFORNIA

Broken line indicates normal

110

105

100

95

90

AVERAGE MAXIMUM TEMPERATURES, DEGREES F.

SEPTEMBER

1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952

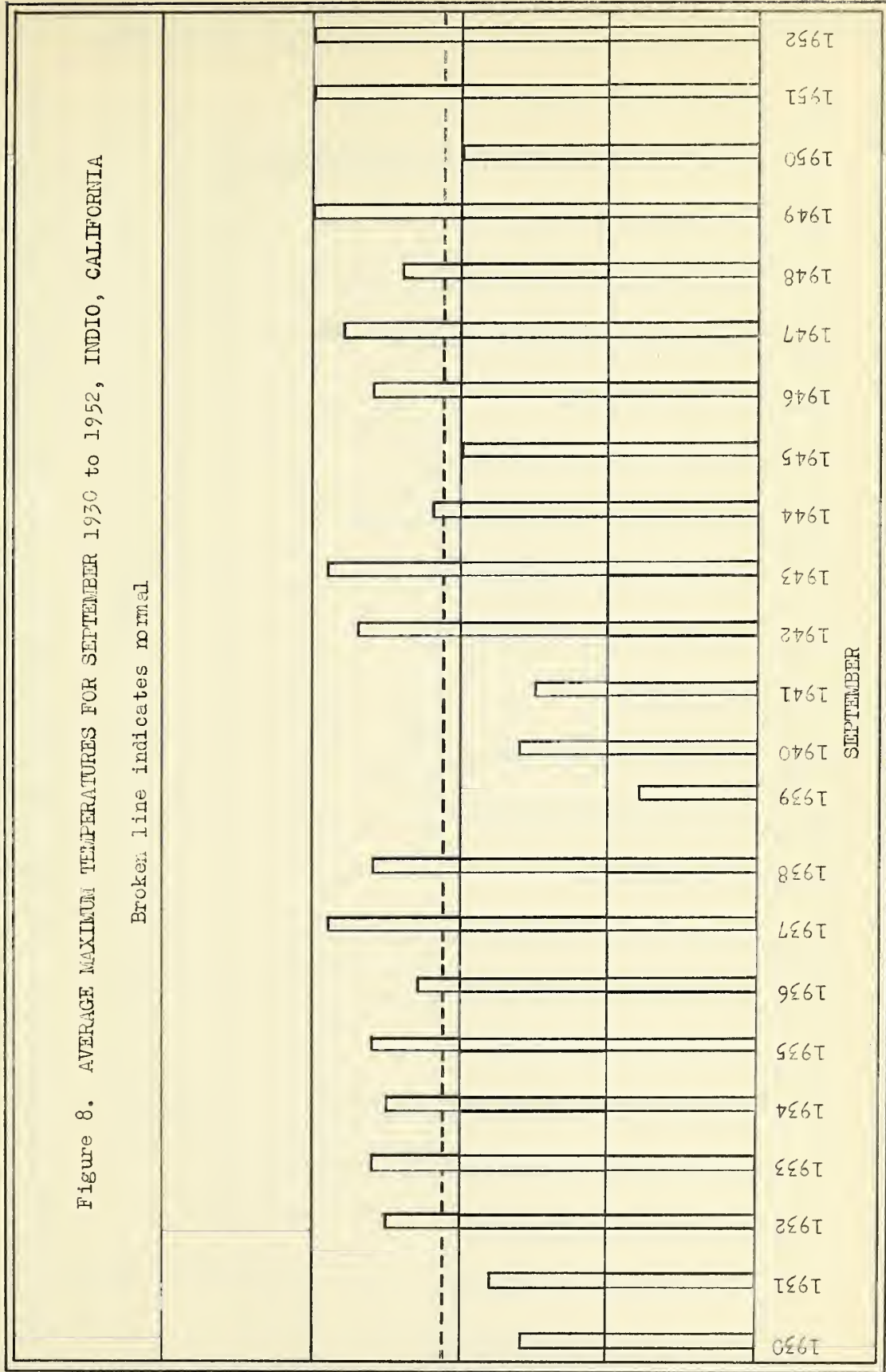




Figure 9. AVERAGE MAXIMUM TEMPERATURES FOR OCTOBER 1930 to 1952, INDIO, CALIFORNIA

Broken line indicates normal

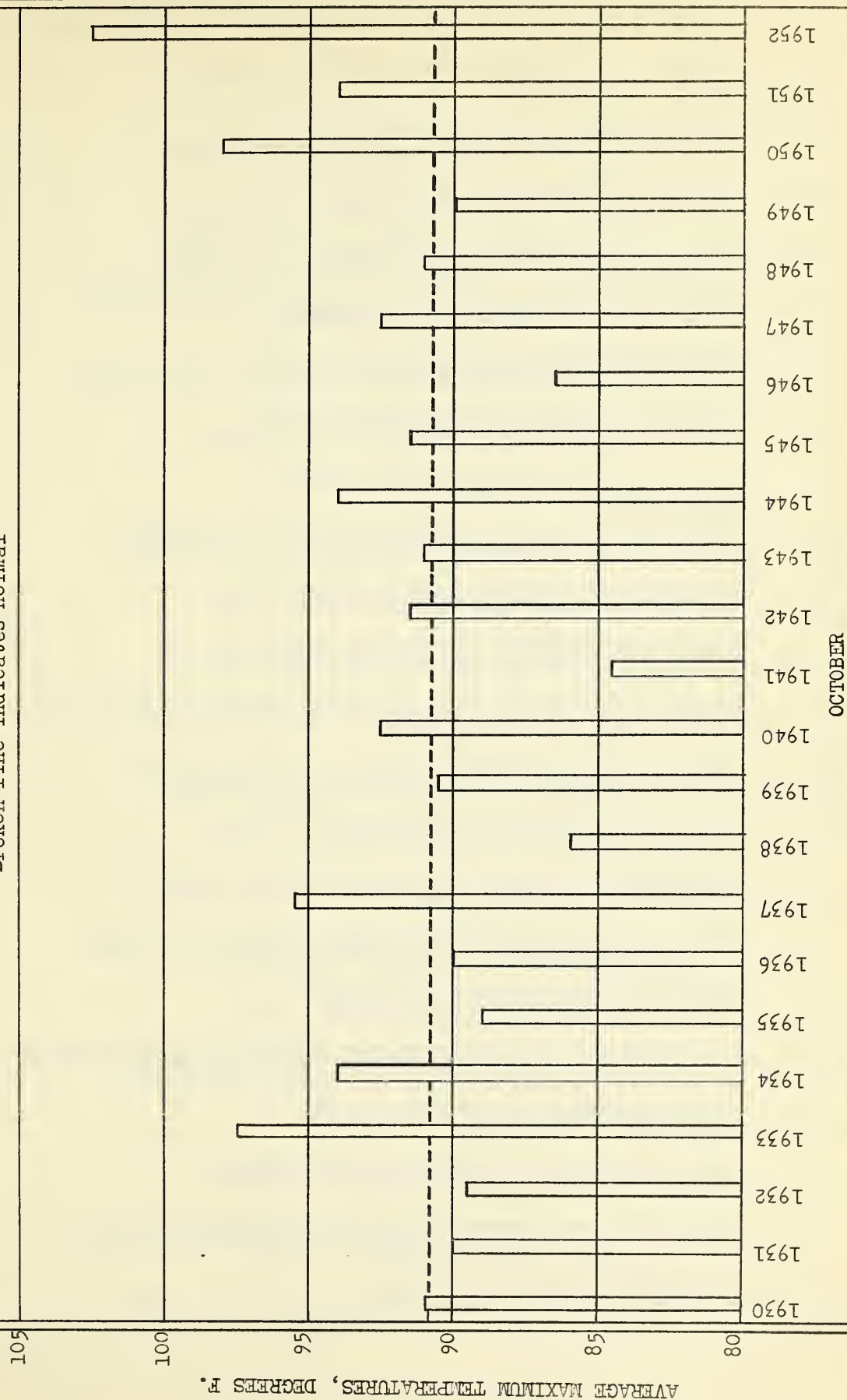






Figure 10. AVERAGE MAXIMUM TEMPERATURES FOR APRIL 16-30 AND MAY 1-31 FOR 1930 to 1952, INDIO, CALIFORNIA

